DOCUMENT RESUME

ED 321 758 IR 014 527

AUTHOR Shale, Doug; Garrison, D. Randy
TITLE Instructional Design Considerations in Telewriter Applications to Distance Education.
PUB DATE Jun 89
NOTE 7p.; Paper presented at the Annual Conference of the Canadian Association for the Study of Adult Education (8th, Ottawa, Ontario, Canada, June 1-3, 1989).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Distance Education; Higher Education; *Instructional Design; Mathematics Instruction; Nursing Education; Special Education; Statistics; Teacher Education; *Teleconferencing; Writing Instruction
IDENTIFIERS *Telewriting

ABSTRACT

This paper describes an audio teleconferencing system enhanced with a microcomputer-based telewriting system and examines its application in the delivery of university courses in statistics, microcomputer applications in special education, nursing issues, introductory writing, and staff development for teachers. The actual application of the technology in these courses is examined in order to demonstrate the versatility of the technology and the range of instructional designs possible with the telewriter. Instructional strategies used in the courses are described and the interrelationship between instructional strategies and subject matter is explored in each case. In conclusion, the paper notes the following instructional issues arising from the experiences described: (1) using the telewriter requires considerable advance preparation; (2) instructors found effective new ways to use the telewriter in distance delivery; (3) the best interaction occurred when students were able to use the technology actively as a tool to promote their participation; (4) since students were intimidated by the equipment, the simplest ways of responding (pen and pad, typing with keyboard) were best; (5) perceived advantages of the telewriter include its capacity to transmit symbolic content (math formulae); (6) the instructional effectiveness of the technology varies according to the nature of the subject matter; and (7) instructors felt that the care and attention required to offer a course using the telewriter improved the quality of instruction. (3 references) (GL)

INSTRUCTIONAL DESIGN CONSIDERATIONS IN TELEWRITER APPLICATIONS TO DISTANCE EDUCATION

by

Doug Shale

and

D. Randy Garrison

Canadian Association for the Study of Adult Education
8th Annual Conference. June 1989

INSTRUCTIONAL DESIGN CONSIDERATIONS IN TELEWRITER APPLICATIONS TO DISTANCE EDUCATION

Doug Shale and D. Randy Garrison, The University of Calgary

Abstract/Resume

A variety of university courses delivered by telewriter enhanced audio teleconferencing are described. Instructional issues are explored in an attempt to guide instructional design decisions for users of similar distance delivery technology.

Cette étude se propose de décrire une variété de cours universitaires dispensés par un système de téléconférence assorti d'un téléscripteur ("telewriter"). Y sont examinés certains problèmes propres à l'enseignement dans le cadre d'une élaboration de programmes mettant à profit une même technologie à distance.

This paper describes an audio teleconferencing system enhanced with a microcomputer based telewriting system and examines its application in the distance delivery of university courses. The paper examines how the technology was actually applied in the delivery of a variety of courses to illustrate the versatility of the technology and demonstrate the range of instructional designs possible with the telewriter. The instructional strategies used are described and we also explore the interrelationship between the instructional strategies and the subject matter.

Telewriting - Enhanced Audio Teleconferencing

In Alberta the audio teleconferencing system allows institutions to deliver courses to about 80 centres. The strength of audio-teleconferencing is undoubtedly its two-way communication capability and for this reason Garrison (1985) classifies such technology as third generation technological innovation in distance education. However, it is not able to support visual instructional interaction. At present, the most versatile and cost-effective way to redress this deficiency is with a microcomputer based telewriting system (Gilcher and Johnson, 1988).

The telewriting system used in this study supports simultaneous aural and visual communication. The system uses a graphics tablet and keyboard on which the instructor can write or type a message which is transmitted immediately together with audio communication along a single telephone line. At all of the centres in the system, students can receive handwritten and/or typed text and/or graphic messages on a colour monitor. Each centre also has the capability of altering images that have been sent out, using a cursor (or pen) to point out features on these images, or creating and transmitting images themselves. All messages and images may be viewed simultaneously in all centres in real-time. The system uses Optel Communications' Telewriter II - PC's using an IDM ™ PC. A more complete description of the system can be found in Shale and Garrison (1988).

Instructional Applications

A variety of university courses have been delivered using the telewriting system described here: statistics, nursing issues, staff development for teachers

and introductory writing. Two courses in preparation are also described, one a micro computers in education course and the other a teacher in-service course on teaching handwriting skills. A structured interview was used with the instructors to ascertain the instructional strategies used. This section describes the instructors' considerations in working out their approaches.

1. The statistics course was designed for delivery as a home study course. It consisted of correspondence style print materials. Students enrolling in the telewriter delivered course received these materials and, hypothetically could have done the course on their own just as the home study students would do. The telewriter system was intended to support the students rather than serve as the primary mechanism for delivering course content.

   The instructor indicated the telewriter would be extremely helpful in: representing formulae and symbols; organizing and displaying the volume of detail involved in statistical analyses; showing distributions, and working through problems. Although students had the material in print form, it is difficult to work a group through such material because of the complexity in referencing and describing it.

   This instructor relied extensively on previously prepared screens, partly because statistics deals with large volumes of data and computations and enumerating everything in real time is awkward and time consuming. A major instructional strategy was to work out solutions on screens that would over-lay so that students would have to think about the next computational step and could be called upon to fill in the missing entries. Partly this strategy was meant to facilitate interaction. Because of limited display area, screens prepared in advance could be better laid out and sequenced. Screens done spontaneously were crowded and hard to read. Moreover, when a screen was full and the problem had to be continued it was essential to carry over critical information. The pen and pad were used extensively for indicating or underscoring important items. It was also used frequently to do unstructured elaborations of various points or to draw illustrations. Students were able to use this feature as well and occasionally were asked to write answers on the screen.

   Interaction with students was attempted by the usual question and answer strategy as well as by having students display answers on the screen using the pen and electronic pad. In an evaluation of the course, students indicated they were dissatisfied with the limited interaction that occurred. However, they clearly came to the sessions poorly prepared to discuss material (many students fell far off the standard pace, as indicated by their assignments) and neither asked questions nor responded very well to the instructor's questions. Students were also invited to phone if they wished individualized treatment but they rarely did so. The instructor felt the unsatisfactoriness of the effort to use the technology interactively was due partly to the unpreparedness of the students, partly to the and nature of the material and partly to poor instructional strategies. Solving problems interactively seemed problematic because the instructor was faced with spending disproportionate amounts of time on some parts and none on other parts (also, some group lead-in seemed unavoidable because students were unevenly prepared and could not participate without having mastered a body of basic information). In addition most solutions required lots of computation and display space on the screen. For most problems, students would have needed training in how to use the system software. The instructor also indicated the heavy reliance on previously prepared screens introduced quite a rigid structure into the sessions. However, the

demands of the material were such that previously prepared screens were essential.

In summary, the instructor reported: the system requires a lot of work in advance preparation and organization; technical glitches were a constant worry and impediment; special and creative strategies are required to facilitate visual and aural interaction.

The instructor felt the system could have been used more effectively, particularly for student participation. One stratagem suggested was to use each telewriter session as a "problems" lab. Selected problems would be chosen to incorporate as many concepts as possible. Screens could be designed to facilitate student response. The major advantage would be that students would have to come prepared, they would have to participate actively, sufficient time would be available to complete the task, and "covering the course" would not be an objective of the telewriter sessions.

2. The microcomputer applications in special education course is currently in preparation. Although little can be said about the success of the instructional strategies in this course, they warrant description and comment.

This course also has considerable printed instructional material. There are two texts, selected because they are pedagogically oriented. Some of the telewriter session time will be elaboration and discussion of content. However, the sessions will be used mostly for student practice software packages and in writing applications of their own. Students will receive instruction from the instructor, on-line, using previously prepared screens. Students will go off-line to use the telewriter PC's as microcomputers to run the actual software packages. Students will have worksheets to follow and the voice component of the system will still be there so that students can talk with the instructor.

Many of the previously prepared screens are reproductions of what students will see when they run the actual applications software. The instructor will execute a particular application and the output would be displayed on the screen. The instructor could "capture" this screen image using the grabber function of the telewriter to create a screen image. This image is a picture of the output which can be called up and displayed to students. This allows the instructor to refer explicitly to what students see when they actually run the application. The instructor considered that this display facility and the capability to jump from screen to screen made the telewriter essential.

A software package under development, called "joint runner" will allow the instructor to execute a program and have what appears on his screen appear simultaneously on all other screens. All centres will be able to view the real-time execution of the software. This would obviate the contrived nature of static screen displays and facilitate interaction.

This instructor was also aware of the problem of too much prior structuring of the course around previously prepared screens. However, the complexity and volume of material to be displayed made it essential to prepare screens in advance. Consequently responding spontaneously in a session will be difficult. This puts a premium on anticipating problem areas accurately. The instructor is over-preparing material to ensure that all contingencies will be covered. He reported that course preparation time was substantial.

3. The issues in nursing course was cut short because of technical problems. Nonetheless, the instructor's view and expectations of the technology are informative. She decided to use the telewriter system because: i) it had potential for actively engaging the students in the course; ii) it would enrich the learning environment by using both the visual and aural senses; and iii) the technology served instrumental as well as instructional purposes (ie. it provided affective support to the learning environment, one example was its use to display a map with each student being located by name).

This instructor used the technology mostly to support interaction, and only slightly as an overhead projector. Students brainstormed by filling in charts summarizing the pros and cons of particular issues (which might also be enunciated by them). Responses were to be transmitted by the pen and pad. The instructor indicated this approach worked much better than it would have orally. The students liked the control they had over the communication.

Both the instructor and the students enjoyed the telewriter system and were disappointed the course could not continue (the instructor reverted to teleconferencing mode). Unlike the previous two instructors, this one thought there was ample flexibility in using previously prepared screens.

4. The writing course consisted of one-third grammar, one-third writing paragraphs and one-third comprehension. In the grammar section, the instructor administered a diagnostic test to the students and going over it was a major instructional event. Technical support staff prepared a set of screens which displayed the test and she and the students worked through it together. The pen and pad were used extensively.

For the writing practice, the instructor used screens to illustrate various principles in composition. She also had the students write paragraphs collectively (using the keyboard) by having each supply a sentence. Discussion occurred as each sentence was added. The instructor was pleasantly surprised with how effectively this worked. Later, when students produced their own paragraphs, the instructor displayed examples on the screen for discussion.

Little use was made of the system for the comprehension part of the course which was aurally based in any event. However, the instructor felt she had to make use of the technology because it was there. This instructor mentioned that a FAX facility would have rounded out the telewriting system. Student assignments were slow and sporadic in arriving through the mail and because several days of lead time were necessary to transpose assignment work to prepared screens, lessons based on the assignments were often compromised. This instructor also remarked on the considerable additional effort required to offer a course.

5. In the staff development for teachers course, the instructor proposed to use an approach similar to that in the nursing issues course. Prepared screens were charts that students would complete with elaborative points added successively. Students were to work as a group at their respective sites to prepare a screen containing their collaborative response which would be transmitted to each other site. These transmissions would be "locked" on display through the central site and other responses would be added in an overlay fashion. This required a level of training of students and site coordinators that defeated the intention. Once again the substantial amount of preparation time required was mentioned.

There is one other course currently at a preliminary stage of development that demonstrates the potential of audiographic teleconferencing. It is a teacher in-service course on teaching handwriting to school children. Because of the emphasis placed on pencil/pen grip, and position of hands and paper, a picture is truly worth a thousand words. Illustrations are being prepared on screens using the system's graphics capability. The graphics feature will also be used extensively to illustrate the forming of letters.

Discussion

The following instructional issues arise from the experiences described here:

- using the telewriter requires considerable effort and advance planning.
- instructors found new effective ways to use the telewriter in distance delivery.
- the "best" interaction occurred when students were able to use the technology actively as a tool in their participation. The least effective occurred when student were simply asked if they had any questions.
- the students were intimidated by the equipment and the simplest way of responding (pen and pad, typing with keyboard) were best.
- perceived advantages of the telewriter system were: it obviated the need for all the extraneous cues and elaboration required in voice-only teleconferencing; it simplified references to things that had a symbolic form (such as math formulae); and as a system, it offered students a visual form of instructional communication in addition to the oral.
- the effectiveness of the telewriter and various instructional strategies clearly varies according to the nature of the subject matter.
- the instructors considered that the care and attention required to offer a course using the telewriter improved the quality of instruction.

REFERENCES

Garrison, D. R. (1985) "Three generations of technological innovation in distance education". Distance Education, 6(2), 235-241.

Gilcher, K. W. and Johnstone, S. M. (1988) A critical review of the use of audiographic conferencing systems by selected educational institutions. The International University Consortium, College Park, Maryland.

Shale, D. and Garrison, R. (1988) 'Evaluating a telewriter system to enhance audio-teleconferencing: A qualitative search for instructional design issues'. Proceedings of the Seventh Annual Conference, CASAE.